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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/990,964	11/21/2001	Andrew Roman Chraplyvy	28-3-1-7	3319
46363 7590 01/09/2008 PATTERSON & SHERIDAN, LLP/ LUCENT TECHNOLOGIES, INC 595 SHREWSBURY AVENUE SHREWSBURY, NJ 07702			EXAMINER LI, SHI K	
			ART UNIT 2613	PAPER NUMBER
			MAIL DATE 01/09/2008	DELIVERY MODE PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	Application No.	Applicant(s)	
	09/990,964	CHRAPLYVY ET AL.	
	Examiner	Art Unit	
	Shi K. Li	2613	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

#### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) ☒ Responsive to communication(s) filed on 19 September 2007.
- 2a) ☒ This action is **FINAL**.                      2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) ☒ Claim(s) 1,4-7,9-13,15,16,19 and 20 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1,4-7,9-13,15,16,19 and 20 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/ are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)   | 5) <input type="checkbox"/> Notice of Informal Patent Application                       |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)<br>Paper No(s)/Mail Date <u>9/21/2007</u> . | 6) <input type="checkbox"/> Other: _____  |

## DETAILED ACTION

### *Claim Rejections - 35 USC § 112*

1. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

2. Claims 1, 4-7, 9-13, 15-16 and 19-20 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 1 recites the limitations "very short" and "very quickly" in line 11 of the claim. It is unclear how short is considered as "very short" and how quickly is considered as "very quickly".

Claim 16 recites the limitations "very short" and "very quickly" in line 10 of the claim. It is unclear how short is considered as "very short" and how quickly is considered as "very quickly".

### *Claim Rejections - 35 USC § 103*

3. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

4. Claims 1, 5, 7, 10-13, 15-16 and 19-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Atia et al. (W. Atia et al., "Demonstration of Return-to-Zero Signaling in Both OOK and DPSK Formats to Improve Receiver Sensitivity in an Optically Preamplified Receiver", IEEE Lasers and Electro-Optics Society) in view of Murakami et al. (US Patent No. 6,307,985 B1) and Cai et al. (U.S. Patent 7,016,606 B2).

Regarding claims 1, 5, 10, 11, and 16, Atia teaches an apparatus adapted for use in transmission in an optical communication system, comprising: a modulator (see "phase modulator" of Fig. 1b) for modulating an optical phase of pulses within a sequence of return-to-zero (RZ) pulses (the sequence of RZ pulses is generated by the first "M-Z" modulator of fig. 1b; see also 4th paragraph, second sentence: "The transmitter consists of a DFB laser externally modulated by a LiNbO3 Mach-Zehnder that is sinusoidally driven to carve out RZ pulses") in accordance with an input digital data stream to form an optical phase modulated signal (see also 4th paragraph, third sentence: "These pulses [i.e. - the carved out RZ pulses] are subsequently modulated by another Mach-Zehnder to encode 10 Gb/s NRZ data), said modulator being one of phase shift keying (PSK), differential phase shift keying (DPSK), or quadrature phase shift keying (QPSK) modulator (this system is a DPSK arrangement - see e.g., title "...DPSK formats"). Atia does not expressly disclose that the optical transmission medium is dispersion managed. However, it is extremely common and usually necessary to manage dispersion along an optical transmission medium. Murakami teaches an optical transmission system comprising a dispersion managed medium utilizing a combination of second and third order dispersion having mutually opposite signs (fig. 1). It would have been obvious to a skilled artisan at the time of invention to incorporate the dispersion managed medium of Murakami in the system of Atia in order to reduce signal deterioration, to avoid the accumulation of third order dispersion and to increase system capacity and transmission distance (see e.g., col. 4, lines 15-27).

The combination of Atia et al. and Murakami et al. still fails to teach quasi-linear transmission. Cai et al. teaches in FIG. 1 quasi-linear optical transmission system. One of ordinary skill in the art would have been motivated to combine the teaching of Cai et al. with the

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modified apparatus of Atia et al. and Murakami et al. because quasi-linear transmission reduces signal distortion due to non-linear effects. Thus it would have been obvious to one of ordinary skill in the art at the time the invention was made to use quasi-linear transmission system, as taught by Cai et al., in the modified apparatus of Atia et al. and Murakami et al. because quasi-linear transmission reduces signal distortion due to non-linear effects.

Regarding claim 7, the combined invention of Atia, Murakami and Cai et al. teaches that the medium is a long-haul transmission medium adapted for transmitting solitons (the medium is a fiber, which is adapted for transmitting solitons).

Regarding claim 12, the combined invention of Atia, Murakami and Cai et al. teaches that the apparatus further comprises a receiver including a delay demodulator for receiving the optical phase modulated signal from the dispersion managed optical transmission medium (note receiver of fig. 1b of Atia; see also middle of 4th paragraph: "the receiver incorporates a Mach-Zehnder demodulator with a 1-bit time delay followed by a 10 GHz balanced detector).

Regarding claim 13, the combined invention of Atia, Murakami and Cai et al. teaches that the apparatus further comprises a balanced receiver for recovering said input data from the phase modulated signal (note receiver of fig. 1b of Atia; see also middle of 4th paragraph: "the receiver incorporates a Mach-Zehnder demodulator with a 1-bit time delay followed by a 10 GHz balanced detector).

Regarding claim 15, the combined invention of Atia, Murakami and Cai et al. teaches a discrete or distributed means of erbium-doped fiber amplification or Raman amplification (see EDFA of fig. 1b).

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Regarding claims 19-20, Cai et al. teaches in FIG. 5 that the pulses have a duty cycle of about 33%.

5. Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over Atia et al., Murakami et al. and Cai et al. as applied to claims 1, 5, 7, 10-13, 15-16 and 19-20 above, and further in view of Ono et al. (US Patent No. 6,097,525).

Regarding claim 4, the combined invention of Atia et al., Murakami et al. and Cai et al. teaches the limitations of claim 1 but does not expressly disclose that the modulator is a PSK modulator. However, PSK modulation schemes are well known in the art, as is disclosed and illustrated by Ono (col. 8, lines 2-8; fig. 12) and are one of a plurality of modulation formats available to an artisan. A skilled artisan would have been motivated to use a PSK modulator in order to take advantage of the superiority in noise-proof capabilities characterized in PSK schemes. Therefore it would have been obvious to a skilled artisan at the time of invention to use the PSK modulation technique of Ono in the modified system of Atia et al., Murakami et al. and Cai et al. in order to allow transmission of healthier signals.

6. Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Atia et al., Murakami et al. and Cai et al. as applied to claims 1, 5, 7, 10-13, 15-16 and 19-20 above, and further in view of Tzukerman et al. (US Patent No. 6,724,829).

Regarding claim 6, the combined system of Atia et al., Murakami et al. and Cai et al. teaches the limitations of claim 1 but does not expressly disclose that the modulator is a QPSK modulator. However, QPSK modulation is a modulation scheme well known in the art of data encoding and is one of a plurality of modulation formats available to an artisan. For example, Tzukerman discloses a QPSK modulator (314 of fig. 3, and col. 4, lines 56-57). It would have

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been obvious to one of ordinary skill in the art at the time of invention to incorporate a QPSK modulator as indicated by Tzukerman in the system of Atia and Murakami because QPSK modulation has the advantages of high spectral efficiency and low bit error rate (col. 4, lines 56-61).

7. Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over Atia et al., Murakami et al. and Cai et al. as applied to claims 1, 5, 7, 10-13, 15-16 and 19-20 above, and further in view of Fukuchi (5,745,613).

Regarding claim 9, the combined system of Atia et al., Murakami et al. and Cai et al. teaches the limitations of claim 1 but does not expressly disclose that the transmitter further includes a WDM to combine an output signal of the modulator with other phase modulated signals having optical carriers with different wavelengths. However this structure is well known in the art. For example, Fukuchi teaches a WDM to combine an output signal of the modulator with other modulated signals having optical carriers with different wavelengths (see fig. 1). It would have been obvious to a skilled artisan at the time of invention to multiplex several modulated signal together as indicated by Fukuchi in order to efficiently utilize the bandwidth in the transmission in the modified system of al., Murakami et al. and Cai et al.

### ***Response to Arguments***

8. Applicant's arguments filed 19 September 2007 have been fully considered but they are not persuasive.

The Applicant argues that there is no suggestion in Atia for combining with Murakami's dispersion managed medium, because Atia's teaching is directed solely to improving receiver sensitivity and that Murakami's method of dispersion management is not of relevance to

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improving receiver sensitivity, and thus, one skilled in the art would not have found it obvious to combine Atia with Murakami. The Examiner disagrees. First, nowhere does Atia et al. limit itself to improving receiver sensitivity. Second, the Examiner recognizes that it is common sense that familiar items may have obvious uses beyond their primary purposes, and a person of ordinary skill often will be able to fit the teachings of multiple patents together like piece of a puzzle. See *KSR International Co. V. Teleflex Inc.*, 550 USPQ2D 1385 (2007).

The Applicant argues that there was no report of RZ-DPSK in fiber transmission link in the post-deadline session of OFC 2001, i.e., prior to Applicants' FC2 paper in 2002 and the fact that Applicant's method was widely adopted, referred to, and followed by Applicants' peers after the 2002 report provides convincing evidence of the non-obvious nature of the method. First, the FC2 paper is authored by A. H. Gnauch, G. Raybon, S. Chandrasekhar, J. Leuthold, C. Doerr, L. Stulz, A. Agarwal, S. Banerjee, D. Grosz, S. Hunsche, A. Kung, A. Marhelyuk, D. Maywar, M. Movassaghi, X. Liu, C. Xu, X. Wei and D. M. Gill while instant Applicant lists as inventors Andrew Roman Chraylyvy, Xiang Liu, Xing Wei, Chunhul Xu. The two lists are not the same. Therefore, the paper is not by the Applicant. Secondly, the paper is not the same as the claimed inventions. Third, prior art is not limited to post-deadline paper of OFC 2001. Fourth, the reason for citing a paper may be due to its deficiency. For example, PD-20 of OFC 2003 states "more simple and reliable and currently available technologies such as 10 Gbit/s line rate and C-band EDFAs are a better choice at least for submarine". Fifth, Atia et al. is also cited by some of these papers. Sixth, none of these papers state any unexpected results of PD-20. In fact, none of the papers talk about the combination of RZ-DPSK with quasi-linear transmission. On the contrary, PD19 of OFC 2003 states that "the use of low-noise Raman amplification, optimized



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modulation formats, high-performance transmission fibers, and advanced forward error correction (FEC) has enabled transmission of multi-terabit capacities over several thousand kilometers with terrestrial amplifier spans.” That is, PD19 teaches that these individual techniques for improving performance can be combined together. The number of papers on DPSK is a strong evidence that it is obvious for one of ordinary skill in the art to modify or combine prior art teachings.

The Applicant argues that even if combined, Atia and Murakami do not teach each and every feature of Applicants’ invention, as provided in amended claim 1. The argument is moot in view of the new ground(s) of rejection necessitated by the amendment.

### *Conclusion*

9. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

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Any inquiry concerning this communication or earlier communications from the examiner should be directed to Shi K. Li whose telephone number is 571 272-3031. The examiner can normally be reached on Monday-Friday (7:30 a.m. - 4:30 p.m.).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jason Chan can be reached on 571 272-3022. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

skl

4 January 2008



Shi K. Li  
Primary Patent Examiner